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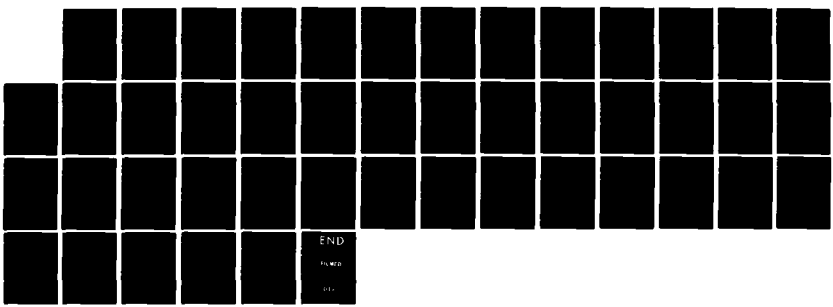

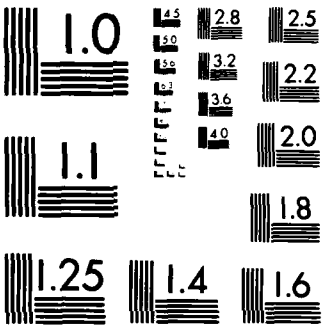

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AN EVALUATION OF THE C-E COST ALLOCATION ALGORITHMS V: INDIRECT PERSONNEL

by

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— STATISTICS —

— OPERATIONS RESEARCH —

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Applied Research in Statistics - Mathematics - Operations Research

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EXECUTIVE SUMMARY

This report by Desmatics, Inc. is the fifth in a series of volumes which review procedures used by the Communications-Electronics (C-E) subsystem of VAMOSC to allocate operating and support costs to ground communications-electronics and meteorological equipment. This volume presents the results of an examination of the algorithms for the three subcategories of Indirect Personnel costs: TDY (Temporary Duty), PCS (Permanent Change of Station), and Medical (Health Care) costs. It also presents a discussion of two additional subcategories of costs which Desmatics recommends including in the Indirect Personnel cost category. These are Retirement Benefits and Dependents' Education Services.

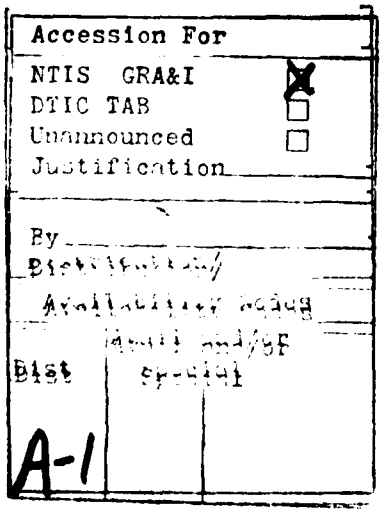
Desmatics has identified several problems with the C-E system processing of TDY costs for mission personnel. In some instances these costs are overstated, while in others they are understated. Desmatics presents solutions to the data problems and recommends an alternative allocation process to improve the accuracy of reported TDY expenses in the C-E system.

The FY82 PCS cost algorithm considers only military mission personnel expenses. However, PCS expenses are also paid to civilians. The C-E system currently selects and allocates civilian PCS costs along with Base Operating Support (BOS) since they are almost exclusively coded with Program Element Code (PEC) xxx96 in the H069R data. The corresponding Responsibility Center/Cost Center Code (RC/CC) for these costs is xx8101. Desmatics recommends removing this cost data from BOS and

separately computing PCS costs for civilian mission and support personnel. These computed costs should then be reported in the Indirect Personnel and Installation Support cost categories respectively.

Several allocation factors, all of which have been evaluated by Desmatics in earlier reports, are used to develop medical costs for the C-E system. Once the recommendations made earlier to improve these factors have been implemented, the FY82 Medical Cost algorithm should provide a reasonable estimate of health care costs for the C-E system.

It is Desmatics' opinion that retirement benefits and dependents' education services are legitimate O&S costs. These are currently partially costed without separate visibility in the C-E system. Desmatics recommends that all these costs be included in the C-E system, and that the portions chargeable to mission personnel be reported as separate subcategories of Indirect Personnel costs. The corresponding costs for support personnel should be included in Installation Support. Desmatics provides a method to compute retirement benefits and dependents' education services for reporting in this manner.



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I. INTRODUCTION

Desmatics, Inc., under Contract No. F33600-82-C-0466, is conducting an evaluation of the cost allocation algorithms employed in the Ground Communications-Electronics (C-E) subsystem of the Air Force Visibility and Management of Operating and Support Costs (VAMOSC) System. The Data System Designator (DSD) for this system is D160A. This is the fifth in a series of volumes which discuss the scope and findings of Desmatics' evaluation efforts.

This report presents evaluations of the cost allocation algorithms for subcategories of Indirect Personnel costs for C-E unit mission personnel. These are defined by the C-E system as Temporary Duty (TDY), Permanent Change of Station (PCS), and Medical (Health Care). These evaluations were made to determine if the D160A system adequately collects the above costs and allocates them to the C-E end items at the Type Model Series (TMS) level in a reasonable manner. It should be noted that the terms "TMS" and "end item" are used interchangeably in this volume. Specific recommendations and Office of VAMOSC comments are enumerated in the last section of this report.

The Statement of Work under which this study was initiated calls for the evaluation of the C-E system algorithms as set forth in the draft of C-E User's Manual (AFR 400-31, Volume III) dated 1 July 1981. The evaluations in this volume, however, are based on the latest edition of the manual, dated 12 August 1982 [11].

The D160A data system has been evolving almost continually since

its inception. Improvements were made in virtually every aspect of the original baseline system prior to the first production run in September 1982. Modifications and enhancements continue to be made, and more are planned for the future. Desmatics recognizes that to restrict its evaluation to the July 1981 baseline would significantly limit the usefulness of its findings. Accordingly, Desmatics has kept pace with the evolution of the C-E system, and has attempted to reflect the significant system changes, specifically in those instances where a given cost was computed by different algorithms in two years. For clarity, relevant portions of the discussions are specifically identified to the fiscal year(s) to which they apply.

Desmatics has endeavored to have this volume reflect the current status of the Indirect Personnel cost allocation algorithms within the C-E system. The authors feel that this has been accomplished. However, the reader must realize that should future changes impact on these algorithms, portions of this report may become outdated.

II. BACKGROUND

The allocation procedures evaluated in this volume involve indirect personnel costs for unit mission personnel. The C-E system defines these as TDY, PCS, and Medical (Health Care). Because the D160A system is unable to obtain these costs at the Type Model Series (TMS) level directly from available data, the costs must be computed and/or allocated on some reasonable basis. The allocation algorithms are described in the following documents:

1. C-E User's Manual (AFR 400-31, Volume III) [11]
2. C-E System Specification, D160A [5]
3. C-E User/Final Operational Evaluation (FOE) Conference Handouts, 1983 [6],
4. Tri-Service VAMOSC Conference Handouts, 1984 [4]
5. relevant Data Automation Requirements

Each subcategory of Indirect Personnel costs is discussed in a separate section in this report. Each section contains a process description and an evaluation of the algorithm used to develop the cost in question.

Another section contains a discussion of two additional subcategories of costs which in Desmatics' opinion should be included in the Indirect Personnel cost category. They are Retirement Benefits and Dependents' Education Services. The methodology for computing and allocating these additional costs is also presented in this section. The final section presents Desmatics' conclusions and recommendations for improving this cost category. The Office of VAMOSC replies are also included.

III. TEMPORARY DUTY

Temporary Duty costs are defined in AFR 400-31, Volume III as the "expenses incurred to move an individual or individuals to a different duty station for a specific period of time (not to exceed 89 days), followed by a return to the original or new permanent duty station" [11]. The C-E system allocates these costs for C-E unit mission personnel to individual TMSs.

A. PROCESS DESCRIPTION

Costs for TDY are obtained from the Accounting and Budget Distribution System (ABDS), DSD H069R. The VAMOH preprocessor system (DSD 160.) selects records from the ABDS data with Responsibility Center/Cost Center (RC/CC) codes of xx26xx (Ground C-E Maintenance) xx35xx (Intelligence Operations), and xx38xx (Communications Squadrons), and passes them to the C-E system. The C-E system selects records for TDY costs which match the reporting OAC/OBANs (Operating Account Code/Operating Budget Account Numbers) of C-E organizations. The Office of VAMOSC maintains a table of the reporting and supporting OAC/OBANs which relate to C-E organizations. An organization's direct expenses are recorded under the reporting OAC/OBAN.

Records in these C-E OAC/OBANs which have Element of Expense/Investment Codes (EEICs) of 407xx, 408xx, or 409xx are considered TDY costs. EEIC 407xx identifies TDY transportation expenses for mission

support by the Airlift Services Industrial Fund (ASIF). EEIC 408xx identifies TDY transportation expenses for mission support by all modes of transportation other than ASIF, and EEIC 409xx identifies TDY per diem and miscellaneous expenses directly related to the performance of an organization's mission [3]. Records with these EEICs are summed by OAC/OBAN to give the total TDY cost for an organization.

TDY costs are allocated to individual TMSs by multiplying the total cost for a given C-E organization by the Unit TMS Allocation Factor. This factor is the ratio of the quantity and purchase price of a single TMS to the quantities and purchase prices of all the TMSs at that organization. It is calculated as follows:

$$f_{TMS} = \frac{Q \times P}{(Q_1 \times P_1) + (Q_2 \times P_2) + \ldots + (Q_N \times P_N)}$$

where f_{TMS} = TMS Allocation Factor for a particular C-E end item at a particular C-E organization,

Q = the quantity of a particular C-E end item in the inventory of a particular C-E organization,

and P = Air Force Stock list price of the C-E end item.

A more detailed description of the Unit TMS Allocation Factor can be found in Volume IV [12]. Once allocated, these costs for each TMS are then summed across all organizations to give the total allocated TDY cost by TMS.

B. EVALUATION

This section includes separate evaluations of the input data and

the algorithm used to determine the share of TDY costs for a given TMS. Desmatics found the input data to be appropriate, but incomplete in some respects. With regard to the algorithm, Desmatics recommends an alternative to the current method which overallocates costs at the organization level.

1. Evaluation of Input Data

Under the current selection process in VAMOH, records with RC/CCs of xx26xx, xx35xx, and xx38xx in the ABDS data are passed to the C-E system. Weather squadron costs (xx34xx) are not selected, but need to be included as well. Desmatics previously recommended [13] that operations personnel of weather squadrons be included as unit mission personnel since weather equipment is costed by the C-E system. Since this recommendation will be implemented, all other costs associated with these weather personnel (e.g., TDY) must also be included in the C-E system.

Costs which pertain to C-E organizations are selected by OAC/OBAN. An OAC/OBAN table, updated yearly by the Office of VAMOSC, includes reporting and supporting OAC/OBANs of C-E organizations. Reporting OAC/OBANs are used to select TDY costs. This table should represent all C-E organizations in the PAS-ORG table, but Desmatics has found a number of OAC/OBANs for C-E organizations which are not included. Table 1 contains a list of OAC/OBANs which are included in the FY82 Unit Factor table (which the Office of VAMOSC develops from C-E Unit Level Reports), but are not found in the OAC/OBAN table. Consequently, TDY

4615	49DM	49EH	49SF
4652	49DN	49EK	49TE
49AC	49DP	49EL	49TF
49DG	49DQ	49MF	49TY
49DH	49DX	49RJ	49WA
49DL	49EF	49SL	49WC

Table 1. C-E OAC/OBANs in the Unit Factor Table, but Not Listed in the OAC/OBAN Table (FY82).

costs for organizations with these OAC/OBANs are not being picked up. This type of undercosting could be reduced by cross-referencing the tables in the C-E system. For example, the OAC/OBANs in the Unit Factor table could be compared with those in the OAC/OBAN table, and discrepancies corrected.

Once the OAC/OBANs are selected, all records with EEICs 407xx, 408xx, and 409xx are considered TDY costs. Three additional EEICs which are related to TDY are included in the EEIC listing of the Air Force Data Dictionary [3], but are not found in the C-E system's EEIC table. A list of these is given below. These EEICs should also be selected as TDY costs by the C-E system as Desmatics has found costs for C-E organizations recorded under these three EEICs.

EEIC	Definition
404xx	Transportation expense of persons funded by ASIF while on administrative TDY
405xx	Transportation expense of persons on administrative TDY by all modes of transportation other than ASIF funded modes
406xx	TDY per diem and miscellaneous expenses for persons on administrative TDY

2. Evaluation of Algorithm

The TDY allocation algorithm sums all selected records for a reporting OAC/OBAN to get the TDY costs for a C-E organization. All TDY costs in an OAC/OBAN are assigned to one organization. Implicit in this algorithm is the assumption of a one-to-one correspondence

between OAC/OBANs and C-E organizations. However, this is not the case, and as a result costs are being overallocated in cases where an OAC/OBAN includes more than one organization.

For example, OAC/OBAN 49CB contains six C-E organizations which are members of the 2046th Communications Group. A list of these is in Table 2. The total TDY cost for this OAC/OBAN in FY82 was $88,629. This total was allocated to each of the three organizations which owned reportable TMSs in FY82 (WE0YF0BZ, WE0YF32C, WE0XFJFF). Because the C-E system treats each organization separately, a total of $265,887 in TDY costs was attributed to OAC/OBAN 49CB. This allocation procedure also ignores the fact that organizations which do not possess reportable TMSs (e.g., WE0YFFJ4, WE0YFFJ5, WE0YFJFC) may have TDY expenses.

In order to avoid this overcosting a relationship between an OAC/OBAN and all of its corresponding organizations must be defined. Since a Personnel Accounting Symbol (PAS) uniquely identifies an organization, a PAS-OAC/OBAN table is one way of accomplishing this. The Unit Factor table does include PAS and OAC/OBAN, but since this table is developed from Unit Level Reports, costs will be missing for units which do not return these reports. Desmatics has examined the FY82 Unmatched PAS Reject Notice of the C-E system, and has found a large number of C-E organizations which are not in the Unit Factor Table. Probably the most efficient and accurate method of determining the C-E organizations in a given OAC/OBAN would be to add a PAS field to the OAC/OBAN table. This table should include the PASs and OAC/OBANs of all the C-E organiza-

PAS	LOCATION	ALLOCATED TDY COSTS
WE0YFFJ4	Wright-Patterson AFB	$0
WE0YF32C	Gentile Defense Electronics Supply Center	$88,629
WE0YFJFF	Springfield Municipal Airport	$88,629
WE0YFOBZ	Fort Knox	$88,629
WE0YFFJ5	Youngstown Municipal Airport	$0
WE0YFJFC	Newark Air Force Station	$0
	Total Allocated TDY Cost	$265,887
	Actual TDY Cost	$88,629

Table 2. C-E Organizations - OAC/OBAN 49CB
2046th Communications Group

tions in the PAS-ORG table, as well as any other organizations in those OAC/OBANs. It is important that all organizations in an OAC/OBAN, whether or not they have reportable TMSs, be included in this table. Otherwise, TDY costs will not be allocated correctly.

The C-E system allocates TDY costs to individual TMSs using the Unit TMS Allocation Factor (f_{TMS}). In Desmatics' opinion this is inappropriate as TDY travel costs appear to have little relationship with the purchase price and quantity of a TMS. A better alternative would be to allocate TDY costs to a TMS based on the number of personnel associated with that TMS. Personnel strengths associated with a TMS can be obtained using the allocation method suggested in Volume I [13]. Since these strengths are summed at the worldwide level, TDY costs must be aggregated to this level also. A method of allocating these costs based on personnel strengths is given below:

$$TDY_{TMS} = \frac{ps}{PS} TDY$$

where TDY_{TMS} = TDY costs allocated to a TMS,

ps = personnel strengths associated with a TMS worldwide (from the method outlined in Volume I [13]),

PS = total number of personnel in all organizations in the proposed PAS-OAC/OBAN table,

and TDY = total TDY cost for the reporting OAC/OBANs in this PAS-OAC/OBAN table.

The total number of personnel in all organizations in the PAS-OAC/OBAN table can be obtained by counting the personnel in the Military Personnel Center (MPC) extract whose PASs are in the PAS-OAC/OBAN table, and then

summing them.

Desmatics recommends allocating TDY costs on the basis of personnel strengths. This is a more reasonable method than the relative inventory value of TMSs, which is the basis of the Unit TMS Allocation Factor (f_{TMS}) currently used. The proposed algorithm also avoids the overallocation of costs at the organization level which occurs with the current method.

IV. PERMANENT CHANGE OF STATION

Permanent Change of Station (PCS) costs are incurred when military or civilian personnel are moved as a result of a change in permanent duty station. These costs include such items as moving allowances, travel expenses and per diem. The C-E system allocates PCS costs for military unit mission personnel to C-E end items.

A. PROCESS DESCRIPTION

Different algorithms were used to allocate PCS costs in FY81 and FY82. The FY82 approach represents an attempt to identify and cost only those personnel who have actually made a PCS move, while in FY81 an average PCS cost was assigned to all personnel.

1. FY81 Approach

In FY81, the total PCS cost for C-E personnel was obtained by multiplying an average PCS cost per person by the total number of C-E personnel Air Force-wide. This cost was then allocated to the TMS level by a factor based on the ratio of a TMS's share of personnel costs to all TMSs' personnel costs. The following formula was used to obtain and allocate these costs:

$$PCS = N \times f_{PCS} \times P_{TMS}$$

where PCS = PCS cost allocated to an end item,

N = the number of C-E personnel worldwide,

f_{PCS} = PCS Cost Factor,

and P_{TMS} = Personnel Allocation Factor.

The PCS Cost Factor (f_{PCS}) is an average cost per military person for a PCS. It is computed as follows:

$$f_{PCS} = \frac{C_O + C_E}{2}$$

where C_O = the average PCS cost per Air Force officer [10],

and C_E = the average PCS cost per Air Force enlisted person [10].

The Personnel Allocation Factor (P_{TMS}) was used to allocate PCS costs to an end item. It is computed as follows:

$$P_{TMS} = \frac{pc}{PC}$$

where pc = the total personnel cost (pay and allowances of mission personnel) allocated to an end item,

and PC = total personnel cost for all C-E end items.

This algorithm does not consider actual PCS moves which have been made, or differences in compensation for different types of moves.

2. FY82 Approach

In FY82 a more direct method of allocating PCS costs was used.

The preprocessor VAMOH identifies in the Military Personnel Center (MPC) data extract those military personnel who made a PCS move during the fiscal year. The MPC personnel records include command (CMD), base (GELOC), Functional Account Code (FAC), Program Element Code (PEC), grade-type (officer or enlisted), type-PCS code, and date-arrived-on-station. For all records where the date-arrived-on-station is during the past fiscal year, the type-PCS code is matched against a table of average PCS cost figures. The matched PCS cost is then copied to the personnel record.

There are six types of PCS moves; a listing of these, along with their associated type-PCS codes, is in Table 3. HQ AF/MPPB provides separate average cost figures for each type-PCS/grade-type combination. These reflect differences in the cost of each type-PCS and in PCS compensation policies for officer and enlisted personnel.

PCS costs are summarized along with personnel counts during VAMOH MPC file processing. They are allocated to individual TMSs by the C-E system in the same way as pay and allowances. PCS costs are allocated using an Operator Factor for operations personnel, a Base Labor Allocation Factor for maintenance personnel, and the Unit TMS Allocation Factor for administrative and supply support personnel [11].

B. EVALUATION

Desmatics believes the FY82 algorithm is a more direct and more accurate method of obtaining PCS costs and allocating them to end items.

CATEGORY	TYPE-PCS CODE
Accession - moves to first permanent duty station	A
Training - moves to, from, and between schools of at least 20 weeks duration	B,C,D
Operational - HQ USAF directed moves within CONUS or nontransocean travel overseas moves	E,F,G,H
Rotational - to and from overseas and between overseas involving transocean travel	J,K
Separation - moves of personnel from last duty station	S
Other - unit moves, PCS of < $100 (CONUS) or < $400 (overseas), AFR and ANG accession and separation, government agencies	P,L,N,Q,V,M,W,X,Y,Z

Table 3. Categories of PCS Moves [8].

The FY81 algorithm did not use actual costs, or the actual number of PCS moves by C-E personnel. The FY82 method is an improvement as it identifies those personnel who have actually made a PCS move. Costs are still not obtained directly, but in Desmatics' opinion the average cost per type-PCS is a reasonable method of portraying PCS costs.

The FY82 algorithm allocates PCS costs in the same manner as pay and allowances. Since PCS costs are related to personnel, Desmatics considers this a valid method of allocating PCS costs, provided the recommendations made in Volume I [13] to improve the pay and allowances allocations are implemented.

1. Installation Support Personnel

The C-E cost allocation algorithm for PCS only includes mission personnel. Desmatics recommends these costs for installation support personnel be included in the C-E system as well. PCS costs can be developed for installation support personnel in the same manner as for mission personnel during VAMOH MPC processing. These PCS costs should then be added to other installation support costs and allocated accordingly. Allocations for installation support were discussed in Volume IV [12].

2. Civilian PCS Costs

PCS expenses are paid to both military and civilian personnel.

However, the C-E PCS cost algorithm includes only military personnel. The C-E system is collecting most of these costs for civilians, but is not providing separate visibility for them. Civilian PCS costs are included in the ABDS system; they have an RC/CC of xx8101 and EEICs of 395xx, 421xx, or 46xxx. Since these records are almost exclusively coded with a PEC of xxx96, the C-E system is collecting and allocating these costs for civilian mission and support personnel as Base Operating Support (BOS).

Desmatics recommends that these costs for civilian mission personnel be removed from Base Operating Support and given separate visibility. PCS costs for installation support personnel should be included with their respective installation support costs (BOS, RPM and COM).

In order that the C-E system be consistent in its treatment of military and civilian PCS costs, civilian PCS costs could be developed in the same manner as military PCS costs. Civilian personnel who made a PCS move in the past year can be identified during VAMOH MPC processing and assigned an average PCS cost. The Defense Communications Agency (DCA) has developed average overseas PCS costs for civilians [2], and these costs could be utilized by the C-E system. Once developed, civilian PCS costs could be allocated to end items in the same manner as military PCS costs. To avoid double costing, records with RC/CCs of xx8101 would need to be removed from the C-E system.

V. MEDICAL (HEALTH CARE)

Medical (Health Care) cost is defined in AFR 400-31, Volume III [11], as the "cost of health care allocated to an end item to support military personnel at their peacetime location." In the C-E system a medical cost factor representing the average annual cost of health care per military person is used to compute medical costs. This factor is computed and supplied annually to the Office of VAMOSC by the Air Force Surgeon General's Office (HQ USAF/SGMC).

A. PROCESS DESCRIPTION

The algorithm for medical care costs was changed between FY81 and FY82. The process description for the FY81 algorithm is presented below. This is followed by the process description for the FY82 algorithm.

The equation for the FY81 algorithm [11] is:

$$MD = N \times f_{med} \times P_{TMS}$$

where MD = cost of health care assigned to a C-E end item,

N = total number of C-E personnel worldwide, computed from personnel data from the MPC Extract,

f_{med} = annual health care cost per active duty Air Force member, from HQ USAF/SGMC,

and P_{TMS} = Personnel Allocation Factor.

The Medical Factor (f_{med}), which is computed and supplied annually by the Office of the Surgeon General (HQ USAF/SGMC) was discussed in an earlier Desmatics report [14]. The Personnel Allocation Factor is discussed in Section IV of this report.

The FY82 method for processing medical care costs in the C-E system differs from the FY81 method in that it allocates the computed medical costs in the same manner as pay and allowances. The procedure is:

1. For each C-E organization accumulate counts of operations, administrative, and supply support personnel by FAC. Accumulate maintenance personnel counts by AFSC.

2. For each organization multiply each total above by the Medical Factor (f_{med}) to obtain medical costs for operations, maintenance, administrative and supply support personnel.

3. Allocate these medical costs to TMSs in the same manner as pay and allowances [11].

Although it is not specifically mentioned in the documentation for either the FY81 [11] or FY82 [5] C-E system processing, the medical costs for each group (i.e., Operations, Maintenance, Administrative, and Supply Support) are computed only for military unit mission personnel.

B. EVALUATION

In Desmatics' opinion the FY82 method for allocating medical costs in the C-E system is adequate in principle. The quality of the reported costs is, however, affected by the factors used in allocating them. These factors are the 1) Medical Factor (f_{med}),

2) Operator Factor (Op), 3) Base Labor Allocation Factor (L_B), and 4) Unit TMS Allocation Factor (f_{TMS}).

In an earlier report [13] Desmatics recommended changes to the Operator and Base Labor Allocation Factors. These are used to allocate the pay and allowances for C-E operations and maintenance personnel respectively. The recommended changes are designed to improve the allocations computed with these factors. In that report Desmatics also recommended distributing Administrative and Supply Support personnel costs with a ratio based on operations and maintenance personnel strengths rather than the Unit TMS Allocation Factor.

The Medical Factor was discussed in conjunction with Desmatics' evaluation of indirect personnel costs for the Weapon System Support Cost (WSSC) subsystem of VAMOSC [14]. During this evaluation, Desmatics discovered that dental care and certain other miscellaneous services were not being considered as part of total health care. The Office of VAMOSC agreed that these costs, as well as medical care for dependents of active duty personnel, should be included in VAMOSC, and that this could best be accomplished by suitable modification of the Medical Factor.

Once the earlier recommendations cited above have been implemented, the computation of medical costs for the C-E system will automatically be affected. The FY82 algorithm should then provide a reasonable means for allocating these costs.

Medical costs for support personnel should also be included in the C-E system. In a previous report [14] Desmatics recommended that

these medical costs be reported under Installation Support along with the other costs in that category. The method for computing the costs to add to this category was provided as well.

VI. OTHER INDIRECT PERSONNEL COSTS

Besides TDY, PCS, and Medical costs there are two other significant indirect personnel costs which, in Desmatics' opinion, should be included and given separate visibility in the Indirect Personnel cost category. These are Retirement Benefits and Dependents' Education Services.

Portions of these costs are currently included, without separate visibility, in the C-E system. For example, the funded portion of retirement and other miscellaneous benefits for civilian personnel are embedded in the standard composite pay rates used to compute their pay and allowances [2]. Some dependents' education costs are included in Base Operating Support, but these represent only a small part of the total cost of these services.

Not currently included in the C-E system are military retirement, the unfunded portion of civilian benefits (including unfunded retirement benefits) and most of the costs for dependents' education services. All of these costs, except for the cost of dependents' education services for Continental US (CONUS) areas, are funded by the Department of Defense (DOD). Dependents' education services for CONUS areas are funded by the Department of Health and Human Services [3].

Although not funded by the Air Force, these costs all represent funds expended or liabilities incurred for Air Force personnel, and as such should be considered O&S costs by the C-E system. Otherwise, C-E O&S costs are understated by the value of these services.

Desmatics recommends the following approach to treating the above costs in the C-E system:

1. Report all retirement (i.e., funded and unfunded) for mission personnel in the Indirect Personnel cost category.
2. Report dependents' education services for mission personnel in the Indirect Personnel cost category.
3. Include miscellaneous unfunded benefits for civilian mission personnel within Unit Mission Personnel costs.

The miscellaneous unfunded civilian benefits are a mixture of direct benefits (cash payments to personnel) and indirect benefits (government payments or liabilities incurred on behalf of personnel) [2]. Included in the latter is the government's share of medical insurance payments. Although these should properly be included with medical care, they cannot currently be estimated from the available information. It is Desmatics' opinion that since the majority of these civilian benefits otherwise correspond fairly closely to those currently incorporated in the standard composite pay rates of military personnel, and are relatively small in magnitude, it is reasonable to include these benefits in Unit Mission Personnel costs.

As discussed in Volume IV of this series [12], all the corresponding costs for support personnel should be included in the C-E system, and reported in the Installation Support cost category. The following sections describe the methodology recommended for including these costs for mission personnel in the Indirect Personnel cost category.

1. Retirement Benefits

Retirement benefits can be estimated by applying acceleration factors to the appropriate standard or base pay rates. As used with personnel costs, acceleration factors are cost factors for estimating the cost of benefits not included in the standard pay rates. They are expressed as a percentage of these rates.

As of September 1983, the acceleration factor for military retirement benefits was 33.0% of the standard composite pay rates used to compute pay and allowances [10]. For civilians, the available acceleration factors for computing benefits are applicable to base pay rates. The standard composite rates currently used to compute pay and allowances for civilians include all funded benefits. These (as of September 1983) amount to 13.997% of the base pay rates. Retirement and "Other" (Miscellaneous) benefits are 29.5% and 6.9% of the base pay rates respectively. These latter two acceleration factors include both the funded and unfunded portions of these benefits.

Using these factors, retirement benefits for C-E unit mission personnel can be computed and allocated as follows:

1. Compute pay and allowances for military operations, maintenance, and administrative (including supply support) personnel using standard composite pay rates. The method is described in AFR 400-31, Volume III [11].

2. Separately multiply the military operations, maintenance, and administrative costs for each organization by the retirement acceleration factor (33.0%).

3. Similarly compute pay and allowances for civilian operations, maintenance,and administrative personnel at each C-E organization, using civilian base pay rates (standard composite civilian pay rates divided by 1.13997) instead of the standard composite rates currently used.

4. Separately multiply the civilian operations, maintenance, and administrative personnel costs for each organization by the retirement factor (29.5%).

5. Combine and allocate military and civilian retirement benefits to TMSs using the methodology previously recommended by Desmatics for allocating the pay and allowances of unit mission personnel [13].

2. Miscellaneous Civilian Benefits

To incorporate all miscellaneous ("Other") civilian benefits in the Unit Mission Personnel cost category, and avoid double-costing funded benefits, the current method of computing civilian pay and allowances in the C-E system must be altered. Civilian pay and allowances are currently computed using standard composite pay rates, but they should be computed using base pay rates (standard composite rates divided by 1.13997 [10]). "Other" benefits, 6.9% of base pay rates [10], can then be computed and added to the total pay and allowances. It is important to note that in processing these costs, the retirement benefits be computed prior to adding the miscellaneous benefits to the pay and allowances. Otherwise the retirement benefits will be overstated.

As noted earlier, the acceleration factors quoted in the above discussion apply to FY83. They are subject to annual revision, and allowance must be made for this in the C-E system.

3. Dependents' Education Services

Dependents' education services constitute a significant expense incurred on behalf of Air Force personnel. The DOD estimates, for example, that the average cost of educating a dependent overseas is approximately $1500 per year [3]. In Desmatics' opinion the cost of such services constitutes a legitimate O&S expense and should be included in the C-E system.

In overseas areas, schools for dependents are usually located on base, and are funded by the Department of Defense. Educational agencies in the United States may obtain federal assistance for school construction, operation, and maintenance when federal activities (e.g., Air Force installations) cause increases in school membership [1]. These expenses may be paid by the Air Force base, but are funded by the U.S. Office of Elementary and Secondary Education within the Department of Health and Human Services.

Dependents' education costs are not available directly, but costs could be allocated by developing an average cost factor similar to the medical care factor. Since costs are related to personnel, they may also be allocated to the TMS level in the same manner as pay and allowances (see Volume I [13]).

For overseas areas the DOD computes factors for three broad geographical areas as well as a worldwide weighted average factor representing the average cost per student for the education of dependent children [2]. Desmatics recommends that the Office of VAMOSC obtain

a list of overseas sites where dependents are authorized and use the average cost per (dependent) student to compute the total cost of dependents' education services for AF employees stationed overseas. This could be computed as follows:

$$E_o = F \times (C_o + M_o) \times n$$

where E_o = total cost of dependents' education services for Air Force employees stationed overseas,

F = average cost per student for dependents' education services overseas [2],

C_o = number of civilian AF personnel, grades of GS-7 and above, stationed at overseas sites where dependents are authorized,

M_o = number of military AF personnel, grades O-2, W-1, E-5 and above, stationed at overseas sites where dependents are authorized,

and n = average number of school age dependents for the above grades of AF personnel overseas [2].

For dependents' education services in CONUS areas, Desmatics suggests that the Office of VAMOSC contact the Office of Secondary and Elementary Education within the Department of Education regarding the availability of a similar cost per dependent or AF employee for CONUS areas, or the requisite data to develop such a factor.

The total cost of dependents' education services in CONUS areas can then be computed in the same manner as was outlined for overseas areas. An education cost factor representing the average cost of dependents' education services per AF employee worldwide can then be developed. This computation would have to be done annually. The equation is:

$$e = \frac{E_o + E_c}{N}$$

where: e = average cost of dependents' education services per AF employee worldwide,

E_o = total cost of dependents' education services, overseas areas,

E_c = total cost of dependents' education services, CONUS areas,

and N = total number of AF employees, worldwide.

The costs of dependents' education services can then be computed and allocated using the same method recommended for medical care, substituting the education factor for the medical factor.

ABDS records with PEC xxx96 and RC/CC xx494x contain some dependents' education expenses for CONUS areas. To avoid double-costing, records with these codes should be bypassed in selecting Base Operating Support costs in the C-E system.

VII. CONCLUSIONS, RECOMMENDATIONS AND OFFICE OF VAMOSC COMMENTS

This volume has presented an evaluation by Desmatics of the C-E system's cost allocation algorithms for Indirect Personnel costs. The C-E system defines this cost category as comprising TDY, PCS, and Medical (Health Care) costs. In addition, Desmatics' recommended expansion of this category to include two additional subcategories, Retirement Benefits and Dependents' Education Services, was discussed.

A. SUMMARY

Desmatics has identified several problems with the C-E system processing of TDY expenses. In some instances this causes understatement of these reported costs, and in other instances, overstatement. Desmatics has therefore developed an alternative allocation process based on personnel strengths which eliminates these problems.

The FY82 PCS cost algorithm provides a reasonable method of portraying military PCS costs. However, PCS costs for civilian mission personnel, which should be included in this Indirect Personnel cost subcategory, are currently embedded in the ABDS data selected for Base Operating Support. Desmatics has outlined the steps necessary to include civilian PCS costs for mission personnel in the Indirect Personnel category.

The various factors required to compute medical costs in the C-E system have all been discussed in depth in previous Desmatics' reports

[13,15,16]. Once these earlier recommendations for improving these allocations have been implemented, the FY82 algorithm should provide a reasonable estimate of medical costs for the C-E system.

Desmatics recommends expanding the Indirect Personnel cost category to include two additional subcategories, Retirement and Dependents' Education Services, and provides the methodology for accomplishing this. These costs are significant, and in Desmatics' opinion, legitimate O&S costs for the C-E system.

B. RECOMMENDATIONS AND REPLIES

This section lists Desmatics' conclusions and recommendations regarding the C-E algorithms for the three subcategories of Indirect Personnel costs: TDY, PCS, and Medical (Health Care). In addition, there are conclusions and recommendations regarding Desmatics proposed expansion of this category to include Retirement and Dependents' Education Services. The responses of the Office of VAMOSC are also included.

1. Weather Squadrons (See page 6)

Conclusion: Since the Office of VAMOSC intends to add operations personnel for weather squadrons (FAC 34xx) to the C-E system, all of their associated costs should be included. Desmatics has found that TDY costs for weather operators are not in the C-E system.

Recommendations: Records with RC/CCs of xx34xx (weather squadrons) should be selected along with other C-E organization RC/CCs during the VAMOH ASO Extract processing.

Office of VAMOSC Comments: "Concur. We intend to implement by FY87."

2. OAC/OBAN Table (See pages 6-8)

Conclusion: Since the OAC/OBAN table is incomplete, TDY costs are being lost for C-E organizations whose reporting OAC/OBANs are not in the table.

Recommendation: The Office of VAMOSC should cross reference the OAC/OBAN, Unit Factor and various other input tables so the C-E system has the most complete information possible.

Office of VAMOSC Comments: "Concur. We plan to add the OAC/OBANs listed on Page 7 to the OAC/OBAN table, and develop a table cross-reference methodology to update the OAC/OBAN table by FY87.

3. TDY EEICs (See page 8)

Conclusion: Not all relevant TDY expense accounts are included in the C-E system. Desmatics has found costs for C-E organizations reported in the excluded accounts.

Recommendation: EEICs 404xx, 405xx, and 406xx represent additional relevant TDY costs, and should be added to the EEIC table.

Office of VAMOSC Comments: "Concur. The Office of VAMOSC recognizes the requirement to include all relevant TDY costs. We plan to implement by FY86."

4. C-E Organization - OAC/OBAN Relationship (See pages 8-11)

Conclusion: There is not a one-to-one correspondence between C-E organizations and OAC/OBANs. The C-E system disregards this, and in cases where multiple C-E organizations share an OAC/OBAN, each will be allocated the total of TDY costs for the OAC/OBAN.

Recommendation: Desmatics recommends the Office of VAMOSC add a PAS field to the OAC/OBAN table to establish relationships between C-E organizations and their corresponding OAC/OBANs. All organizations, including those which do not have reportable TMSs, must be included in this table to avoid misallocation of TDY costs.

Office of VAMOSC Comments: "Concur. Adding a PAS field to the OAC/OBAN table will avoid misallocation of TDY costs. We intend to implement by FY86."

5. Alternative Algorithm for TDY (See pages 11-12)

Conclusion: TDY travel expenses appear to have little relationship to the purchase price and quantity of a TMS. Personnel strengths associated with a TMS are a more appropriate cost driver.

Recommendation: The Office of VAMOSC should replace the current allocation algorithm with the one proposed by Desmatics in Section III. This algorithm uses personnel strengths rather than the Unit TMS Allocation Factor as the basis for allocation.

Office of VAMOSC Comments: "We concur that TDY costs are personnel related and should be allocated to C-E end items on the basis of personnel strengths instead of equipment values. We will implement by FY86."

6. Civilian PCS Costs (See pages 17-18)

Conclusion: PCS costs for civilian mission personnel should be included in the Indirect Personnel cost category. They are currently embedded in the ABDS cost data selected for Installation Support.

Recommendation: The Office of VAMOSC should develop PCS costs for civilian mission personnel as outlined in the text, and report these costs along with military mission personnel PCS costs in the Indirect Personnel cost category. To avoid double-costing all records with RC/CC xx8101 should be bypassed in the selection of ABDS installation support cost data.

Office of VAMOSC Comments: "We concur in principle and will seek guidance from the CAIG before implementation."

7. Medical Costs (See pages 20-22)

Conclusion: Upon implementation of recommendations made previously by Desmatics [13,14], the FY82 algorithm for medical costs will provide an adequate means of computing these costs in the C-E system.

Recommendation: The Office of VAMOSC should continue to use the FY82 algorithm to develop medical costs for the C-E system and should continue to pursue implementation of Desmatics' earlier recommendations cited above.

Office of VAMOSC Comments: "We concur and plan to implement by FY87. This recommendation depends on implementation of Desmatics recommendations for modifying the medical factor, base labor allocation factor and unit TMS allocation factor."

8. Other Indirect Personnel Costs (See pages 23-29)

Conclusion: Besides TDY, PCS, and Health Care there are two other significant costs which should be included in the Indirect Personnel cost category. These are Retirement Benefits and Dependents' Education Services.

Recommendation: The Office of VAMOSC should add these two subcategories of costs to the Indirect Personnel cost category. They may be computed and allocated as described in the text.

Office of VAMOSC Comments: "Concur in principle. These seem to be relevant costs that should be included in the indirect personnel cost category. However, we will seek guidance from the CAIG prior to implementation."

9. Miscellaneous Civilian Benefits (See page 26)

Conclusion: Unfunded miscellaneous civilian benefits should be included within Unit Mission personnel costs.

Recommendation: The Office of VAMOSC should compute pay and allowances for civilian unit mission personnel as outlined in the text. This will ensure inclusion of both funded and unfunded miscellaneous benefits for these personnel.

Office of VAMOSC Comments: "We concur in principle and will consult the CAIG prior to implementation."

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This is the fifth volume in a set of reports which document the findings of a study being conducted by Desmatics, Inc. for the Office of VAMOSC. This study constitutes an assessment of the cost allocation algorithms employed within the Communications-Electronics (C-E) subsystem of the Air Force Visibility and Management of Operating and Support Costs (VAMOSC) system. The C-E system ascertains historical operating and support (O&S) costs for items of AF ground C-E equipment and displays them in 19 categories.

This report evaluates the algorithms used to determine indirect costs

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20. incurred on behalf of C-E personnel and allocate them to individual C-E equipment end items at the type-model-series (TMS) level. These costs include Temporary Duty (TDY), Permanent Change of Station (PCS), and Medical (Health Care). This volume presents Desmatics' conclusions and recommendations, and the comments of the Office of VAMOSC.

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